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ABSTRACT

In a cooperative task, American Indian elementary students produced bilingual natural history dictionaries using a Macintosh computer. Students in grades 3 through 8 attended weekly, multi-graded bilingual classes in Hupa/English or Yurok/English, held at two public school field sites for training elementary teaching-credential candidates. Teams of three students worked together at the computer to complete a dictionary page, a task involving selection of a natural item, formulation of its definition, transcription in the Unifon alphabet, translation to English, and page layout. The project focused on written sentence construction and oral communication skills. The goal of producing a dictionary dealing with plants and animals known to local tribes allowed students to use knowledge obtained from family and other tribal members. The computer provided concrete realization of abstract concepts and a self-directed interactive learning environment. Classroom observation showed that (1) students worked on the project willingly for the entire school year; (2) students' oral communication skills, used in the cooperative learning groups, developed over the year; (3) students tended to build on the work of other students; (4) older and younger students differed in their ways of viewing the natural world; and (5) older students advanced from producing literal English translations to making "good" free translations. The success of this project points to the importance of implementing a teaching methodology compatible with the learning style of the home culture. This report contains 26 references. (SV)

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COOPERATIVE LEARNING WITH A COMPUTER IN A NATIVE LANGUAGE CLASS

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COOPERATIVE LEARNING WITH A COMPUTER

IN A NATIVE LANGUAGE CLASS

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ABSTRACT

Through an instructional activity on a Macintosh computer, I have sought to demonstrate effective classroom language learning for Native American students. The project focussed on two types of language learning in a cooperative task where students produced a Natural History Dictionary. The two types of language learning are (1) oral language communication skills and (2) sentence-building in writing skills. The students in our study are in multi-graded (grades 3 - 8) bilingual Hupa/English or Yurok/English classes, with the 3-5 grade level constituting the younger students and the 6-8 grade level, the older students; the classes are held in two public school field sites for training elementary teaching credential candidates at Humboldt State University Results showed that when the older and younger grades were compared, there was development in oral language skills. The implications of the study for teacher training points to the importance of a culturally relevant approach to teaching writing to minority students

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> Children find in the question, "Are computers Alive?" a way to talk about the line between computers and people. "What is life?" "What makes us special?" "How do computers challenge our definition of ourselves?" Different styles of relating to the computer correspond to different kinds of answers.
>
> Sherry Turkel, The Second Self: Computers and the Human Spirit, 1984.

Studies of how Native American children learn language have sought to identify features that change as children grow older. Whereas early research on child language development focussed on changes in grammatical usage, (W.F. Leopold, 1949; S. Ervin-Tripp, 1973; H. Dulay and M.K. Burt, 1974) Developmental research with Native children has been more recent, concerned with identifying features associated with communicative competence (K. Watson-Gegeo & S. Boggs,1977; T. Weeks, 1970; R. Bennett, 1979.) Studies of learning by Native American children in classroom environments have focussed either on problems blocking learning or on the participant structure conducive to learning (V.P. John, 1972; S. Philips, 1972; Mohatt & Erickson, 1982.) By focussing on the computer as a learning tool, this study proposes a unique solution to finding a learning style appropriate to children in Native American culture.

The rationale for the study is that a lesson on writing using a computer and a cooperative learning methodology will provide the proper focus to enhance learning for American Indian students. The approach has benefitted from Kagan's research in cooperative learning where the way the cooperative lesson is organized is influential on the student's performance. (Kagan, 1986) Five types of cooperative learning structures have been identified. The one we are concerned with is the cooperative project, where a group works in teams of 3-5 members each, to accomplish a common goal. The goal in this project was to produce a bilingual Natural History Dictionary, dealing with plants, animals and other things in nature known by the local Indian tribes. This goal was chosen to give Native American students a chance to work together in an area where they can bring in knowledge they have gotten from parents and others in their Indian culture. The rationale is that students will be more willing to produce in school if a bridge can be found between their home culture and classroom learning.

A cooperative learning project was chosen as another way to create this bridge, since Native American children have been shown to learn better where the focus is on group accomplishment, rather than individual achievement. (Philips, 1972)

The Indian languages described here are those still spoken by tribes in Northwest California: the Hupa, Yurok, Karuk, and Tolowa. These languages are extremely rich and varied communication systems, deriving from three distinct language families, (Athabaskan, Hokan, and Algonquin), and containing oral traditions that have encoded the history, governance, scientific knowledge, social mores, and literary expertise of peoples who have existed on their current tribal homelands for 2,000 and more years. These languages are oral, not written, and present special problems to the language learner who needs to be introduced to concepts inherent in written language, such as grammar. An approach that would take into account the oral nature of the language of the people, and that would use the oral tradition of American Indians. The Natural History Dictionary provided such a focus, as there is abundant information about plants and animals in the Indian oral tradition.

Subjects and Setting

The students in the study attend two elementary schools on the Hoopa Indian Reservation; both schools are public schools in a rural environment. The Hupa school is situated in the largest town on the reservation, 1700 persons. The Yurok school sits between the two ancient Yurok villages of Pecwan and Johnsons. A single lane paved road leads to the road up to the school. Electricity is provided through generator-power.

The students ranged in age from seven to fourteen. They received weekly multi-graded instruction on one Macintosh computer throughout one school year. The computer instruction constituted the only planned cooperative learning lessons in their week, although the students participated in other cooperative activities, primarily in sports. The students also participated in competitive learning situations, and some of these involved public activities, such as district-wide debates, science fairs, and contests..

THE TASK

There are four components of the task:

1) The Task Focuses on Language Learning:

Since Indian people have an oral language culture, the concepts underlying written language, such as grammar, are not familiar to them. In oral languages, getting the message across is primary, and frequently meaning is perceived as an action, or as a visual image, rather than as a set of grammar rules. Language variation is related to differences in social situation and other factors of usage, rather than to differences in verb structures, or other linguistic differences. One of the challenges posed by the study was to find a way to present written language lessons compatible with the way that language is viewed by the Native American.

2) The Task Utilizes a Macintosh Computer:

Another tactic to make written language learning interesting to Indian students was to use a Macintosh computer. In learning how to write, the child needs to build general thinking skills like concentration, memory, understanding of cause and effect, and other relationships. These concepts can be excessively abstract for the Indian child's intellect, as can the concepts of grammar involved in sentence-building in two languages, and part of the key to the success of instruction is providing concrete realization for the abstraction (P. Gonzalez, 1980)

A computer provides concreteness, as it is a visual tool. Moreover, a computer provides cooperative interaction with the student, and has been found to be effective with students who have special needs, such as students from oral cultures who are learning disabled in their written language learning. (M. Behrmann, 1984) The Macintosh computer and a graphics software program were chosen where learning is self-directed rather than rote, and where the graphics capabilities of the Macintosh allows for a bilingual text (using a specially designed Indian language alphabet font), and illustrations.

3) The Task Is Cooperative

One of the most important findings to emerge from recent cooperative learning research is the strong achievement gains among minority pupils in cooperative classrooms. Dramatic gains made by minority and lower status students have been documented for Black students, Asian students, students from Middle-Eastern backgrounds, and other ethnic minorities. (E. Aronson, et al., 1978; A. Klein and Y. Eshel, 1980) In cooperative learning, students plan and carry out activities and accomplish learning tasks in groups,with a variety of ways of providing for rewards for the achievements of individuals within the group. Cooperative learning has begun with a way to teach social skills, but has been purported to be a general strategy for promoting higher achievement in all subject areas and covering all tasks. (D. W. Johnson & R. Johnson, 1981)

The cooperative participant structure was ideal for a project devoted to teaching writing skills because the people think of language as a social activity, and can make a transition to written language more effectively if it is presented as a group activity.

4) The Task Aims to Develop Communication Skills

The cooperative nature of the task was such that talk between students contributed to the team effort of completing a book. In focussing on a team product, with individual contributions, talk centered around the nature of individual contributions. Communication skills related to cooperation were studied: How the students asked for and received (or gave) help, how they communicated their notions of the task, and how they formulated the language used in the dictionary definitions themselves.

PROCEDURE

Three students sat together near the computer and took turns being the one who operated the keyboard and the mouse. On some occasions, the task was shared by two students, with one operating the mouse and the other the keyboard. An adult bilingual supervisor or the regular classroom teacher determined order of turn-taking (who was to be in each group was

negotiated with the regular classroom teacher; the order of typing on the computer was determined by the adult bilingual instructor.) The object of the lesson was to complete a page or a part of a page in a Natural History dictionary. The dictionary contained names of animals, birds, fish, plants, trees, and other natural phenomena that were known by the Indian ancestors. Completing a page involved selecting an item, formulating its definition, and translating the definition. Illustrations, variations in type setting and arrangement of words and pictures on the page were other decisions made by individuals. Finally, the students were involved in a cooperative project, with a common objective, where individual decisions contributed to the quality of the group endeavor.

The Program MacPaint was used throughout the project. The Macintosh computer facilitated the cooperative nature of the project in that its programs allow the student to make decisions and to direct the computer to accomplish goals extrinsic to the program. This type of program is different from programs that proliferate on other educationally oriented computers, such as the Apple IIe, where there is an emphasis on asking the student to react to pre-programmed sentences or fill in words in a sentence. (Underwood, 1984)

First, the task balanced individual and cooperative participation in a way that provided opportunity for individual learning, yet focussed individual attentions on the group objective. Second, the task involved cooperation between upper elementary students and middle elementary students, so that older students and younger students had the opportunity to interact with one another, as well as with their own age group.

Gathering Data

Care was taken to record data representing the entire range of the interactive event, and observations were in the form of audio-tapes, video-tapes, and written notes. Observations were also recorded outside of the interactive event, such as during lunchtime, recess, and during other out-of-classroom events, for the purpose of determining the "typicality" of the cooperative behavior observed during the microcomputer sessions.

Observational records resulted in documenting the nature of the

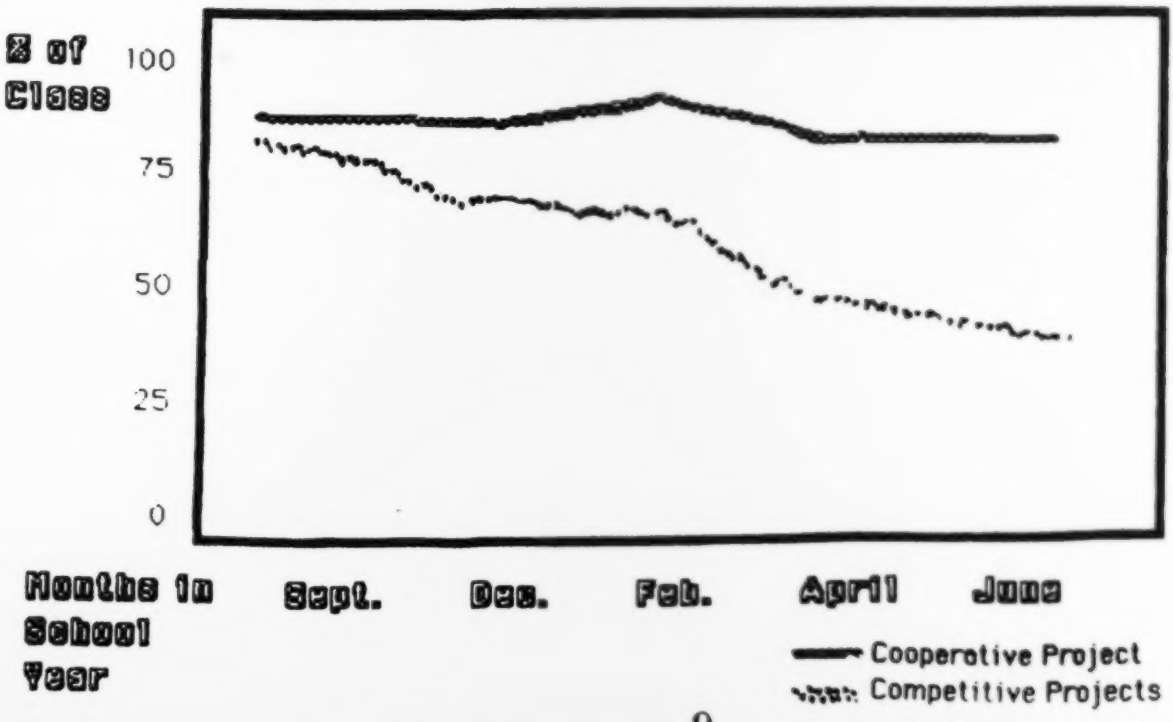
children's interest in the project, and their faithfullness in pursuing the dictionary project over a period of months until it was completed. Finally, we were interested in determining whether there were differences in the nature of the learning between the two types of peer interaction, i.e., whether there were differences between peer interaction involving older and younger students as compared with peer interaction between students of the same age.

RESULTS

First, results showed that the students were willing to spend the time on the task necessary to complete it; they worked on the project willingly for an entire school year. Table 1 contrasts the participation of students in bilingual project as compared with monolingual instruction where participation in the bilingual project increased as the year proceeded (from 40% to 80% of the students) whereas participation in the monolingual language instruction decreased slightly (from 38% to 31%).

Table 1

Participation in Cooperative Computer Project as Compared with Competitive Language Learning

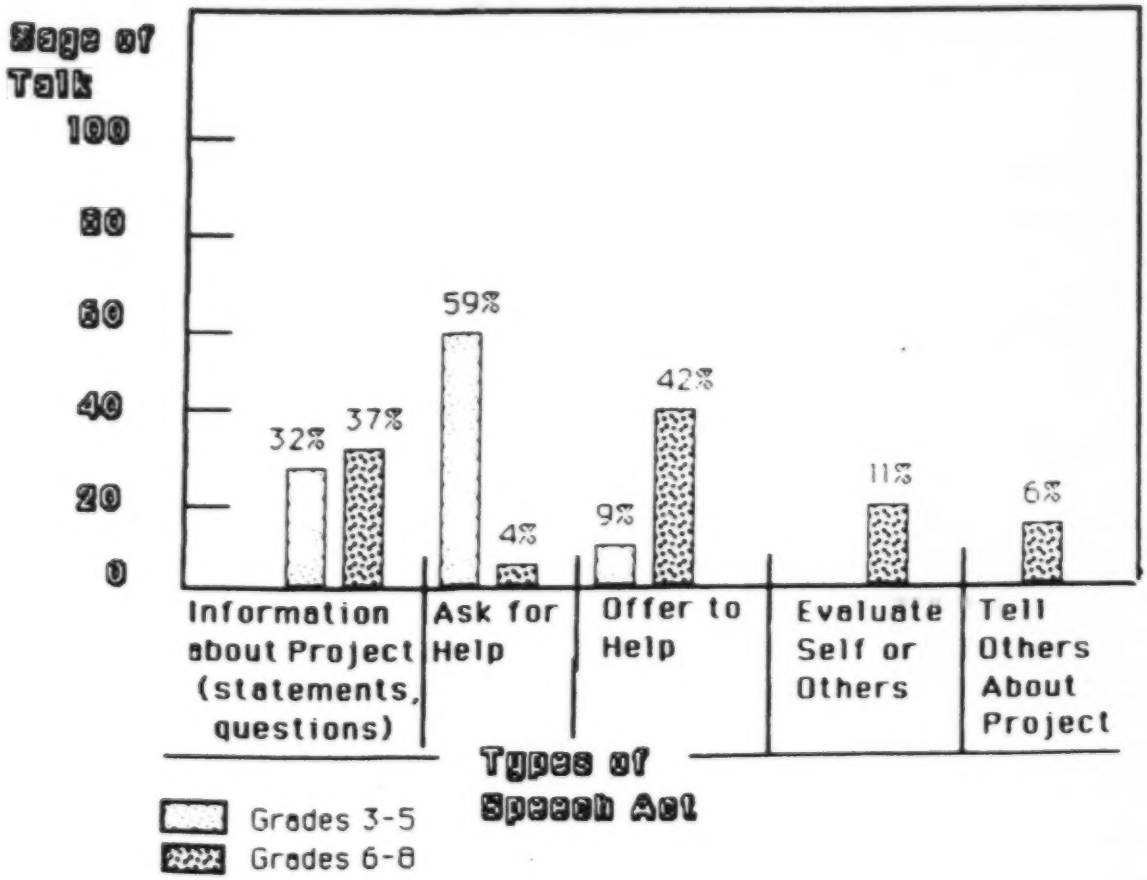


Results displayed in Table 2 showed that the students took advantage of the cooperative nature of the project to communicate with each other and with the instructor. Development in communication skills was evidenced in the spontaneous utterances of the students, as they engaged in task-centered talk. Talk of students was coded in five different areas:

(1) Giving or Asking for Information about Project, (2) Asking for Help, (3) Offering Help, (4) Evaluation, and (5) Telling Others about the Project. A comparison of the communication skills of younger and older children is presented in Table 2, where the younger group are grades 3-5 and the older group are grades 6-8.

Table 2

Types of Talk Demonstrating Development in Communication Skills

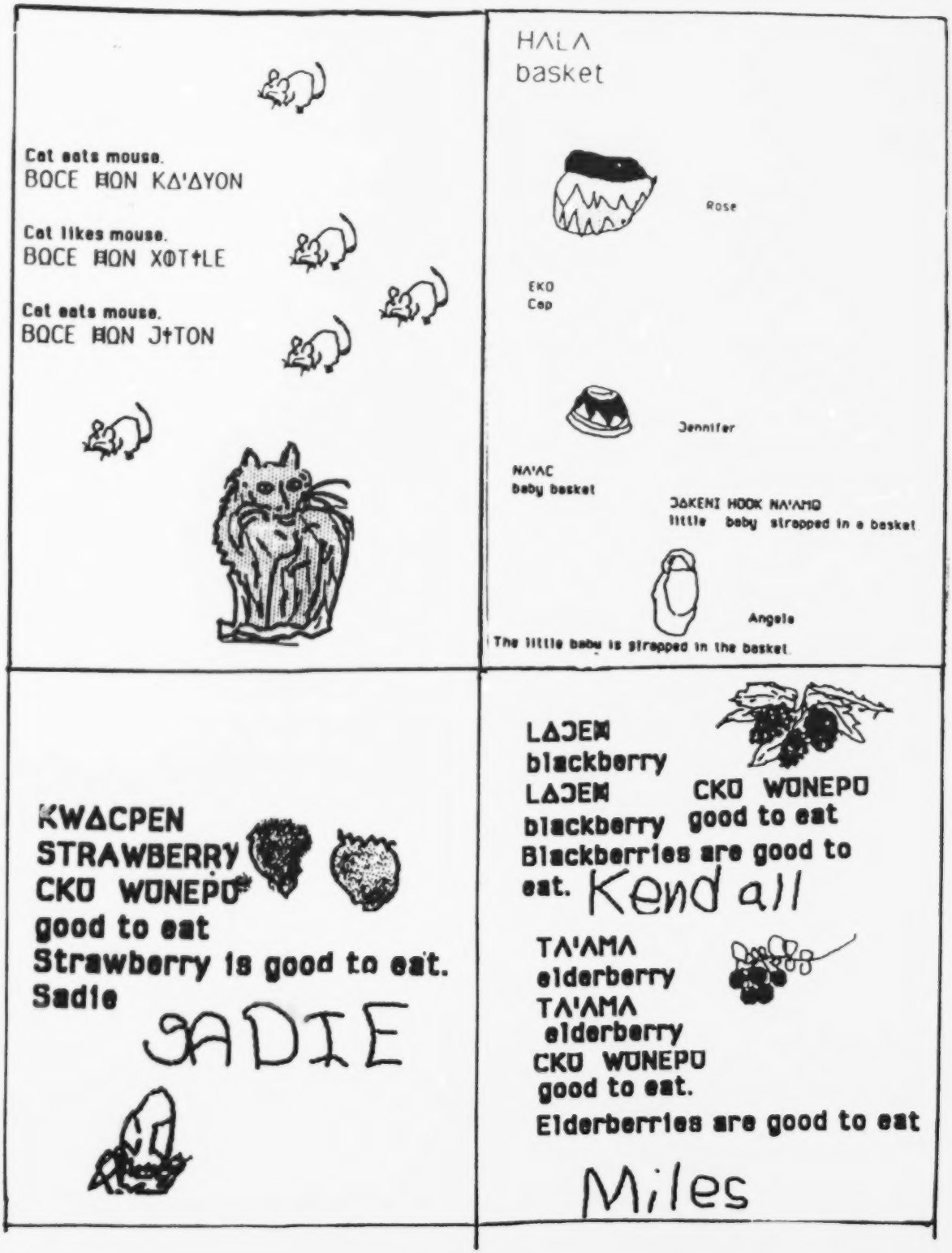


As shown in Table 2, it was found that older students were more likely to offer than to ask for help, (42% as compared with 4% of their utterances), and more likely than the younger students to offer information or ask questions about the task, although this difference was close. (37% of the older children's talk concerned information, as compared with 32% of the younger group's talk.) Further, there were two areas where older children verbalized their thoughts, but younger children did not. These were in the areas of evaluation and telling others outside the project.what the group was doing. (11% of the older children's talk dealt with evaluations of someone's performance, and 6% of the talk was to tell others what the group was doing.)

A major part of the cooperation between the children occurred in two areas: Asking for Help and Offering to Help. Help frequently involved planning how to express definitions or how to do the graphics involved in the definition. Older children were the ones who planned their dictionary pages in advance; older children were also more innovative in spontaneous decision-making: thinking on the spot of unique layout, printing and font-size combinations, and ways to illustrate their page.

Table 2 demonstrates that when given choices, student talk in the cooperative learning groups covered a variety of topics, and further, that the diversity of the topics increased as the children grew older. Communication skills were practiced in the tasks of the project, and development is evidenced by the increased diversity of the older children's talk.

In addition to opportunities for development in the communication skills area, the project offered practice in other areas of language proficiency. The dictionary task provided an opportunity for children to express their notions about specific animals and plants. Whereas the younger age group were thinking about the body functions of the animal, or about the human body in relation to a plant, such as a berry, the older age group were focussed on identifying the plant or animal in relationship to its environment. The next two pages provide illustrative examples.



Cat eats mouse.
BOCE ⊞ON KΔ'ΔYON

Cat likes mouse.
BOCE ⊞ON XØT†LE

Cat eats mouse.
BOCE ⊞ON J†TON

HΛLΛ
basket

Rose

EKO
Cap

Jennifer

NA'AC
baby basket

ƆΔKENI HOOK NA'AMƆ
little baby strapped in a basket

Angela

The little baby is strapped in the basket

KWΔCPEN
STRAWBERRY
CKU WUNEPU
good to eat
Strawberry is good to eat.
Sadie

ƧADIE

LΔƆE⊞
blackberry
LΔƆE⊞
blackberry
CKU WUNEPU
good to eat
Blackberries are good to eat.
Kendall

TA'AMA
elderberry
TA'AMA
elderberry
CKU WUNEPU
good to eat.
Elderberries are good to eat

Miles

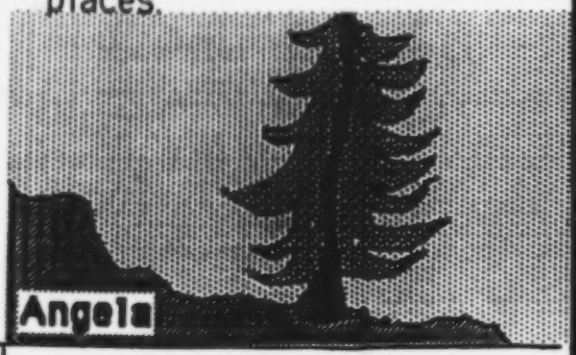
Dictionary Entries from Students in Grades 6-8

KLOMEWE' KLOMEWE'
Cottontail grassy places

Cottontail stays in grassy places.

PA'AGEH NI HUNEM'
swampy place it grows
TΔWAL NI TΔPΛ
spruce

Spruce grows in swampy places.



Angela

RIGAQ NI HUNEM' HΔGOPΛ
shore it grows cottonwood

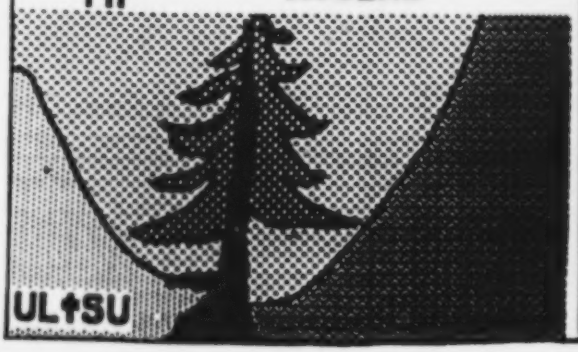
ULISU

HECI HIR
Little farther back from shore
NI HUNEM' HΔGOPΛ
it grows cottonwood

LINU

ƆIKAL' N↑NI HUNEM'
everyplace it grows
O TΔPΛ
fir

R↑Ɔ∃RD



UL↑SU

K↑NI PA'AGEH
wherever swampy places
NI HONEM' HA'UQ
it grows cedar
Cedar grows in swampy places.

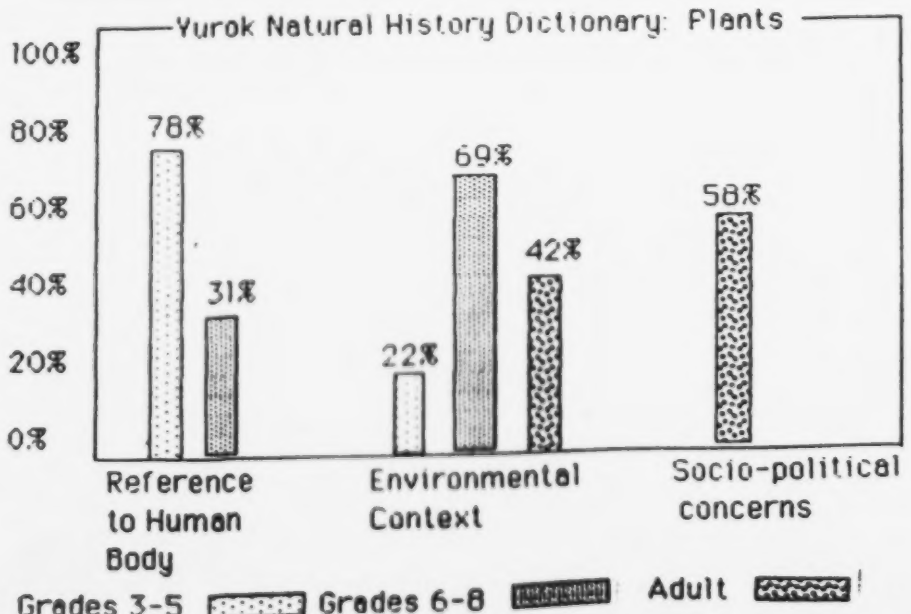
Alicia

One feature that was particularly interesting in the results was the tendency for one child to imitate the pictures and sentence structure of a child who took a previous turn. With younger children, this took the form of exact imitation or of imitation with a one word substitution, (Turn #1: strawberries are good to eat, Turn #2: strawberries are good to eat, Turn #3 blackberries are good to eat, etc.) whereas with the older group, it was an opportunity for a variation of a theme (Turn #1 Spruce grows on the coast, Turn #2 fir grows everywhere, Turn #3 Cedar grows in swampy places.) Older children also showed the tendency to create drawings that were variations on a previous child's drawing, as when one student draw a tree standing on a hillside, and others drew their trees with some variations on this theme.

These drawings were seen as a visual demonstration of cooperative learning,when a student benefitted from the drawing of the previous students, and made his own contribution. There is an analogy with Indian literature and art, where each version of a story or basket is generally the same, but slightly different from every one product. Some of the more significant differences between the Younger and Older age groups are graphed in Table 3.

Table 3.

Ways of Thinking about the Natural World



Differences in the content of the dictionary entries between older and younger children point toward a developing in the way of viewing the world. Whereas younger children talked about eating, or sleeping, or moving, 78% of the time, and the environment only 22% of the time; the older group talked about the environmental context 69% of the time, and body functions only 31% of the time. An adult group, comprised of student teachers and bilingual native teachers, in contrast to both children's groups, emphasized socio-political concerns, such as polution or ecology. 58% of the adult defintions were in this category, whereas 42% were expressions of knowledge about the environment, and none referred to body functions.

Other aspects of the task that provide a source for further study are as follows: The dictionary task involved certain skills directly related to spelling, vocabulary, grammar, translation. Also, the project provides practice in computer-related skills, such as word processing and computer graphics.. Development in these skills was noticed as well, with older students producing longer definitions, and more intricate computer drawings.

Finally, the study provided for practice with translation skills. older students were able to distinguish between free and literal translations and were better able to produce both "good" English sentences, and "good" Indian language sentences. This task was difficult because of differences in syntax and grammar in Indian languages as compared with English. First, word order of the Indian langauge sentences is different from English. Second, grammar for each of the languages is different as well. What this means is that literal translations do not generally produce "good" sentences in both languages, and it takes the skill of a more advanced learner to proceed from a literal translation to a "good," free translation.

Discussion

Teaching Techniques Compatible with Learning Styles

Creating solutions to problems Indian students face in schools is an

important one. Finding teaching techniques compatible with the way that Indian children learn is one of the keys to the solution. Finding a solution is urgent since dropping out of school is a common experience for Indian children. Today, it seems inconceivable that there are populations of students in the United Stated who do not graduate from eighth grade. Typically, in Indian classrooms, children lose interest in language-related tasks in school as they proceed to upper grade levels, when interest is defined as something initiated the children themselves. Until approximately the third grade, the children are at a stage in language development where they need assistance in designing and executing a task. From the fifth grade on, demonstrated interest appears to wane, and they are less likely to accomplish language-related tasks on their own initiative for a different reason.

The study was successful in showing some of the rules that Indian children use in accomplishing writing tasks, and in demonstrating that these rules may be behavioral. The rules that many of the children appeared to be following, for example, might be stated:

WRITE SOMETHING APPROPRIATE:
RULE #1 CREATE A MODEL or
RULE #2 PRODUCE A VARIATION ON A MODEL or
RULE #3 ASK SOMEONE WHAT TO DO.

The above rules appeared to follow a hierarchy in the sense that the older children created an original sentence or a variation of someone else's model, and only the younger children asked for instructions. The language that the children learned, then, had a social aspect to it. Language learning was defined as demonstrating competency in a social situation, with language as the vehicle. Some of the best evidence was the degree to which one student would create a pattern with their definition and illustration, and then another would follow this pattern. Undersstanding this phenomena takes us back to the oral language basic in the culture. Just as oral language is a purely social activity in Indian culture, the children showed their predilection for the social aspects of written language by making it a social activity as well. This tendency to learn within a social context underlies the importance of teaching strategies that take into account the nature of behavior among children in tribal communities.

Why Cooperative Learning Methodology Works with Indian Students

Indian children know that they are expected to try out the skill they have observed, to test themselves until they are successful in a diversity of situations, and then to show the results of that success publicly, as a sort of performance. In being successful in demonstrating differences between older and younger students, the study succeeded in showing thatan important feature of a cooperative learning environment is the contribution to the child's self-esteem. Heightened self-esteem will, in turn, increase the likelihood that he/she will want to stay in school.

A second important feature of cooperative learning is as a methodology that offers a balance between individual and group needs. (S.T. Boggs, 1985) Indian norms have been found to be fundamentally democratic and respectful of individual growth as a member of a family unit. Family survival requires cooperative behavior. Indian students have been found to have difficulties in achieving because of the prevalence of competitive norms in school. Since Indian children exist in this larger society and depend upon the larger society for their survival, it is important that they learn basic skills in a way congruent with their home training, before they are thrust out into a world where they are hopelessly outnumbered and which offers no adaptation to their needs at all. Cooperative learning offers effective group participation.

The success of cooperative learning techniques can be understood by comparison with competitive classroom environments. Cooperative learning does not put individuals on the spot, whereas the competitive method aims to single out individual achievement in contrast to others. One common competitive learning environment occurs when children maintain a one-to-one question-answer dialogue with an adult teacher. Children are tested individually by the teacher, in the presence of observers, and the entire class knows of the child's success or failure. Although this method may be the most common model used in American schools today, it has not proven successful with Indian students. If the child fails, he is embarrassed, but if he knows too much, he is embarrassed also because in both cases he/she is singled out, and this

may violate the Indian child's notion of group identity. In some classrooms that have been studied, the competitive question-and-answer structure so threatens the child's sense of worth that he/she may feel it is impossible to verbalize anything. This is one source for the "silent Indian" syndrome. (R. Dumont, Jr., 1985)

What Value is There in a Project Centered on the Natural World?

The process of all intellectual growth has long been recognized to involve interaction with the environment. Piaget has pointed out that intellectual growth is a process of developing from a self-centered world where expression of immediate desires is primary to a world of socially agreed upon meaning. Language, for Piaget, is a crucial focus for development of symbolic thought since it is through language that the child learns to express himself/herself, accommodates to the demands of his environment, and modifies his behavior accordingly.

A study that focuses on the child's knowledge about his natural world offers an opportunity for development of language, since it deals with an area of thought that where Indian people are cognizant. The predominance in the younger child's mind of those plants that can be eaten, and the predominance in the older child about where the plant can be found or what the behavior of an animal is, shows development from self-centered thinking to an understanding about the relationships between things.

Making a Bridge Between the Oral and Literate Culture

One important contribution that school can make to the Indian child is to bridge the knowledge between written and oral language. These two modes of language represent different ways of thinking. Research has shown that oral thinking patterns may be significantly different from thinking patterns derived from written models for thought. Research occurring in Russia with non-literate people was conducted by Luria, a contemporary of Piaget, but the findings were not known until the 1970's. (A.R. Luria, 1976) Luria's investigations showed that nonliterate peoples follow rules that ressemble the stage of concrete operations, and that these people actually avoid abstract reasoning, seemingly because they place priority on their immediate sensory experiences, and on their

recollections of these experiences.

In addition to the oral language environment of the American Indian, and the cooperative nature of education in the home, there is another factor that influences their learning styles. Indian people want to be contemporary. Living in primarily rural environments, their main access to the contemporary world is through the media. With the constant presence of the media in the home through TV, having an instructional tool with a TV screen in school is a good instructional strategy. It allows for creative interaction, rather than passive entertainment, and encourages children to use their knowledge and creative potentials. Interaction with the computer is almost a form of play. Instruction with the Macintosh computer was found to be a ready focus of attention for Native students, an excellent way to make the learning of the language contemporary, and to provide skills appropriate for students thinking about a future in professional life.

Conclusion

This study offered student teachers an opportunity to become engaged in an educational process of cooperative learning. In observing the development of elementary school children, they were able to see what components are influential in language learning, and how these components can interact. Through a focus on communication skills and ways of thinking about the natural world, I emdphasized two areas that have general applicability to many areas of learning, hope to offer to readers a model for a successful learning venture, and a greater understanding of how to teach children from minority cultures.

In sum, the project was effective in these ways: (1) the older students demonstrated a development in communication skills in the way that they handled the interaction related to the task. (2) In the writing task, the older students indicated an awareness of the environment when defining terms, whereas the younger students centered on knowledge about their own bodies; 3) As instruction for prospective teachers, the study points to the importance of understanding cultural learning styles, and implementing a teaching methodology that is compatible with learning

style in the home culture 4) The computer was a useful tool in the writing project, providing the means for including a phonetic alphabet and for illustration and layout. The computer and the focus on natural history offer a way of teaching writing by providing an interesting writing tool and focussing on a culturally relevant content area.

Dr. Ruth Bennett is a Professor in Education at Humboldt State University, and has served as Director of the Bilingual Emphasis Program since 1981. Since 1979, she has directed a state-approved bilingual teacher credential program sponsored by the federal government's Office of Bilingual Education and Minority Language Affairs. The project described here is sponsored by Humboldt State University: the elementary school classes in the study are laboratory classrooms within the Bilingual Emphasis Credential Program at Humboldt State University, where University teacher trainees carry out practice teaching. The activities described in the paper above were partially sponsored by Apple Education Affairs, who provided a Macintosh 512k computer.

Before coming to Humboldt, Dr. Bennett received her PhD in Bilingual Education at the University of California, Berkeley in 1979; she received her M.A. in English from the University of Washington, and her B.A. in English from Indiana University.

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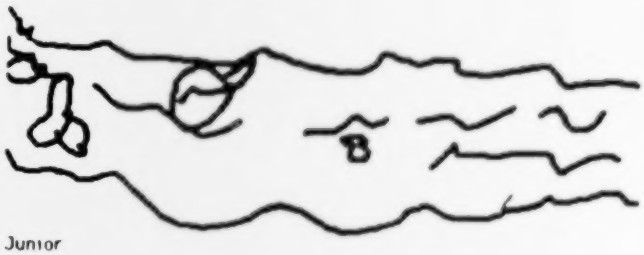
RAAG↑K NI HONEM' W3R3RG3R3
creek it grows alder
Alder grows by the creek



Junior

K↑NI HA'EGANA⊞ NI HONEM' HINKE⊞
wherever rocky place it grows white oak

wherever rocky places are, white oak grows

Yurok
Unifon

Single Sound Alphabet

A Δ Λ C Ↄ D E I
gt ate gll cell goy chair dip hen he
∃ G H ✝ ⏃ K L M N
her goat hat bit bite kiss ice music no
O Ω Φ Q ⧉ P R S
lot old lock out boy pipe run sure
T U Ո W Y ⊟ X X̄
table up due wig yes khah (jungle) (gar